APPARATUS FOR PRESENTING VISUAL MATERIAL WITH IDENTIFIED SENSORY MATERIAL

RELATED APPLICATIONS

This is a continuation of U.S. patent application Ser. No. 08/474,707 filed on Jun. 7, 1995 now abandoned, which is a divisional of U.S. patent application Ser. No. 07/980,649 filed on Nov. 24, 1992, U.S. Pat. No. 5,484,292, which is a continuation-in-part of U.S. application Ser. No. 07/685,278, U.S. Pat. No. 5,167,508 filed by the same inventor on Apr. 15, 1991, currently co-pending, which is a continuation-in-part of U.S. application Ser. No. 07/396,129, filed by the same inventor on Aug. 21, 1989, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the general field of apparatus and methods for combining audio and visual indicia of information. Specifically, the present invention relates to apparatus and methods for enhancing the comprehension and retention of information displayed in a book by combining audio and/or visual messages with the presentation of printed material.

2. Description of the Prior Art

Comprehension of printed matter is a high priority educational objective of modern society. It is known that comprehension of all printed material depends on the viewer's ability to interpret visually perceivable information in accordance with previously acquired knowledge associated with that information. Accordingly, various attempts have been made at producing aids to enhance the process of interpretation of such visually perceived information in order to improve its comprehension and assimilation.

Among the various devices found in prior art, U.S. Pat. Nos. 4,021,932 to Lipps (1977), No. 4,189,852 to Chatlien (1980), No. 4,273,538 to Ross (1981), No. 4,425,098 to Doring (1984), No. 4,752,230 to Shimizu (1988), No. 4,778,391 to Weiner (1988), and No. 4,809,246 to Jeng (1989) disclose several approaches utilized to provide effective highlighting of printed material, either for amusement purposes or for improving the comprehension and retention of a reader. U.S. Pat. No. 4,809,246 to Jeng, in particular, teaches a sound illustrated book that utilizes a page sensing element that triggers an audio recording of a description of the printed matter on the page being viewed.

In U.S. Pat. No. 4,703,573 (1987), Montgomery et al. disclose an electronic book apparatus with audio and visual components for electronically generating and transmitting a combination of sound and electronic images to identify the information displayed on an open sheet. Control circuitry is provided on the sheet to coordinate the functioning of the audio and visual displays according to a predetermined sequence considered appropriate to enhance understanding of the material. Similarly, U.S. Pat. No. 4,363,081 to Wilbur (1982) describes the use of light emitting diode (LED) components to highlight drawings and other printed matter in greeting cards.

In addition, U.S. Pat. No. 4,209,824 to Kauffman (1980) discloses a book comprising pages including electrical circuitry and apertures with light emitting devices in each page to illuminate areas of pictures printed on the page. U.S. Pat. No. 3,592,098 to Zadig (1971) teaches a flexible conductive ink which enables the sheet on which the ink is printed to be folded across the ink without breaking the ink circuit. In U.S. Pat. No. 1,545,217 (1925) and No. 1,670,254 (1928), Thurber and Gowin show the forming of conventional, non-electronic, books by folding a single sheet in accordion style. Finally, U.S. Pat. No. 2,277,318 (1942) and No. 2,444,355 (1948) to Grant and Kniznick illustrate the making of conventional books by folding a plurality of sheets in half and binding them at the folds to the spine of the book.

A review of the prior art shows that most devices developed to date merely present an audio description or lighting of printed matter illustrated on a page. Others appear to limit the audio and/or visual enhancement to just printed words or printed images. Most importantly, though, the various kinds of apparatus used in prior art are not practical for bound book format. Moreover, the approaches taught in prior art to control the functioning of both the audio and/or visual displays are specific to the requirements of each page; therefore, they are not suitable for voluminous multi-page applications. Finally, no existing electronic book utilizes visual and audio messages in interactive fashion with the reader to illustrate the printed material.

Therefore, there still exists a need for practical apparatus wherein visual information, presented in any character or image form on a page of a book (hereinafter referred to generally as visual matter, printed matter, material, or information), is explained, highlighted, or in any way enhanced by sound and/or light displays systematically synchronized with the information to stress its meaning and improve comprehension and retention on the part of a reader. In particular, there is a need for a compact method of manufacturing that is suitable for assembling many pages into a single bound book in an economical and practical manner.

SUMMARY OF THE INVENTION

The present invention provides an electronic book apparatus that produces audio and/or visual enhancement of printed information.

In accordance with one aspect of the present invention, visual signals are produced in conjunction with the display of the printed information in the book in order to highlight and draw attention to it.

In accordance with another aspect of the present invention, an audio signal, or message, is produced in conjunction with the display of the printed information in the book to describe and facilitate the reader's recognition and understanding of the material and to further highlight its presence on a page.

In accordance with yet another aspect of the present invention, synchronization between the audio and visual signals is provided in connection with any portion of the printed information to which they pertain, to clearly focus the attention of the viewer on the particular portion of interest and improve his or her comprehension of the material viewed.

In accordance with still another aspect of the present invention, synchronized audio and/or visual messages are delivered according to a predetermined schedule appropriately chosen for educational or entertainment purposes.

In accordance with another aspect of the present invention, an interactive system is provided whereby the reader of the book can chose between alternatives to best suit his or her interest, so that the reader's attention can be further stimulated by direct involvement in the viewing progression through the material in the book.

Another aspect of this invention provides a novel method of manufacture of an electronic book that permits the